

Fig. 3. 3D structure (A) and quality of DC-(G₄S)₃-DT-(G₄S)₃-SDC1 based on Ramachandran assessment (B).

similarity in other species. Moreover, *in-silico* searching as well as literature review led to disclosed 20 cells surface specific antigen of brain tumors. Following, the results of corresponding ligands survey of detected antigens led to disclosure 200 matching ligands with various in function, structure and affinity to specific antigens. However, docking process led to disclosure SDC1 as a best ligand with capacity to binding to four different antigens with different binding affinity (Figure 2).

Meanwhile, assessment the post-translational modification (PTM) of detected ligands led to disclosure that some of them are poor in PTM. In this regard, SDC1 PTM was confined only in two sites for phosphorylation without any glycosylation sites. On the other hand, our survey on therapeutic products of bacteria led to exposure a domain with ability to crossing the BBB. Finally, the assembly of the selected domains with glycine-serine linker led to generation a series of novel immunotoxins constructs. Subsequently, the products assays of these constructs showed quality in structure as well as in expression after codon optimization (Figure 3).

However, among these constructs the product of DC-(G₄S)₃-DT-(G₄S)₃-SDC1 with the length of 462 amino acid showed the lowest immunogenicity. Taken together, the results of this study provide a series of cell death domain, specific ligands for targets antigen of tumor brain, and also a new immunotoxin for target therapy.

Keywords: Brain tumors, Blood-brain barrier, Target therapy, *In silico* biology

An *in-silico* survey on molecular mechanisms of antioxidative capacity, as an opportunity for cancer prevention

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Extended Abstract

Introduction: Cancer is a dreadful human disease, increasing with changing life style, nutrition, and global warming. In this context, there are increasing evidences that oxidative processes and

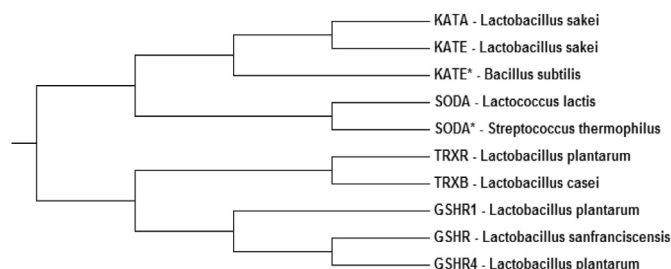


Fig. 1. Dendrogram of selective antioxidative enzymes.

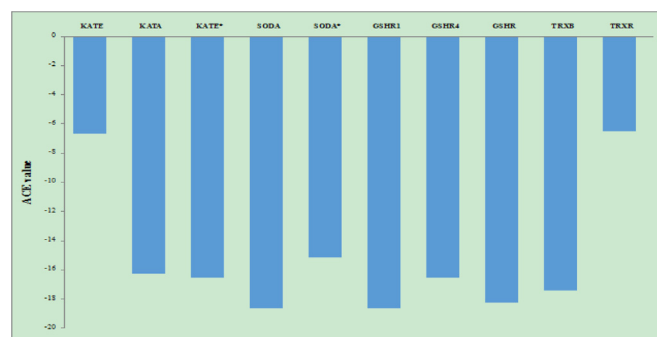


Fig. 2. Comparison the binding affinity of the selective enzymes to H₂O₂.

reactive oxygen species (ROS), which could be arising from industrialization of the societies, caused changes in the accurate function of the macromolecule such as DNA and proteins, which in turn could promote various malignancies. On the other hand, several modes of action by which carcinogens induce cancer have been identified, including through ROS production. Antioxidants play an important role in the later stages of cancer development via the regression of premalignant lesions and inhibit their development into cancer. Antioxidant enzymes, which are synthesis in the body, and antioxidants derived of the herbs make the first and second natural barrier, respectively, which led to neutralize, scavenging and or eliminate these factors. Preliminary studies have indicated that some antioxidants, particularly β -carotene, may be of benefit in the treatment of precancerous conditions such as

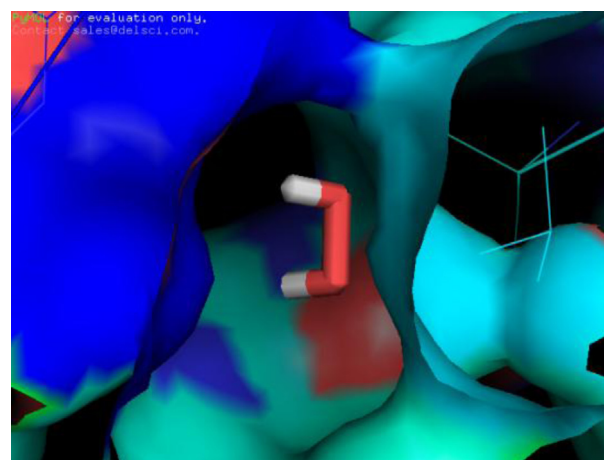


Fig. 3. Representation complex of SODA protein with H₂O₂, as an instance model.

oral leukoplakia, possibly a precursor of oral cancer. So reinforces the antioxidant capacity of the body could be prevent early events in tumor development. In this regard, reports suggest reducing the toxic effects of ROS through administration of probiotics. Probiotic are defined as “live microbes which, when administered in adequate amounts, confer a health benefit to the host. These strains which are capable to limit excessive amounts of ROS in *in-vivo* condition, may contribute to prevent and control several diseases associated with oxidative stress such as cancer. Therefore, a thorough understanding of probiotic ingredients and their molecular mechanisms would influence the development and selection of efficient type of the anti-cancer probiotic strains, which was considered in this study based on *in-silico* investigation on involved molecular mechanisms.

Materials and methods: In this study, at the first step a comprehensive profile of antioxidative enzymes of probiotics were gathered. Furthermore, the nucleotide and protein sequences of the selective enzymes and related producing and affecting molecular mechanisms in hosting bacteria were determined. The nucleotide sequences of selective genes and corresponding proteins were retrieved from NCBI, Uniprot, ExPASY, EMBL and then molecular analysis of these sequences were performed via Blast under various matrix, InterPro-Scan, Motif scan, CD search, ProtParam, and MEGA6. 3D structure of ROS and selected enzymes were derived and or prepared via several Databank as well as online and offline programs including Pubchem, Colby, PDB, SWISS-MODEL and Modeller. Moreover, the affinity of the enzymes to ROS were performed via PatchDock and visualized by Pymol.

Result and conclusion: The result of enzyme profiling led to 10 key enzymes of 7 probiotic species including *katE*, *gshR1*, *gshR4*, *trxR*, *katA*, *katE**, *sodA*, *sodA**, *gshR* and *trxR* with different structure, function and activity against oxidative stress. Moreover, the results of proximity of these enzymes led to disclosure of two distinct clusters of relationship (Figure 1).

In addition, protein sequences analysis lead to disclosure parser domains of ROS including H_2O_2 to H_2O and O_2 , superoxide radicals to O_2 , as well as FAD/NAD(P)-binding domain with role cell redox homeostasis and oxidoreductase activity in the enzymes. Meanwhile, this analysis led to detected immune-responsive domains in the protein sequences of the KATA, KATE and KATE*. On the other hand, docking process of selective enzyme to ROS represents high binding affinity of them to H_2O_2 (Figure 2).

As showed in this figure, binding affinity of total enzyme are in suitable condition, however SODA (Representation complex in Figure 3) and GSHR1 demonstrate more affinity. Furthermore, homology searching led to disclosure of similar sequences of the enzymes with high quality in various genus of bacteria including *Bifidobacterium*, *Lactobacillus*, *Streptococcus*, *Bacillus*, *Enterococcus*, *Weissella*, *Pediococcus*, *Leuconostoc*, *Tetragenococcus*, *Peptoniphilus* and *Listeria*. Overall, the elimination of ROS is one of the key capabilities of probiotic strains of bacteria based on the presence of antioxidant enzymes in the prevention of inflammatory diseases and gastrointestinal cancers, which were confirmed in this study by corresponding enzymes characterization. On the other hand, sequence analysis led to disclosure of specific domain with cancer prevention capacity. Moreover, homology searching identified a series of new strains of bacteria that may be used as probiotic after experimental analysis.

Keywords: Reactive oxygen species, Cancer, Probiotics, Oxidative resistance

Under-estimation and over-estimation in gastric cancer incidence registry in Khorasan provinces, Iran

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Extended Abstract

Intriduction: Gastric cancer is a disease in which the cells forming the inner lining of the stomach become abnormal and start to divide uncontrollably, forming a mass called a tumor. Gastric cancer was 4th most common cancer among men and 5th most common cancer among women diagnosed in 2012 in the world, and is first common cancer among Iranian men and the 3th (after breast cancer and colorectal cancer) among Iranian women. In medical studies, a difficulty in drawing inference from categorical data is the existence of misclassification error. Although among medical indexes, incidence is a familiar projection in the assessment of the burden of diseases, the presence of misclassification error makes the registry systems inaccurate and unreliable to use for estimating the burden of disease and other epidemiological criteria, and consequently flaws the planning for cancer prevention. Misclassification error is the disagreement between the observed and the true value and occurs when new cancer cases diagnosed and registered in neighborhood provinces instead of their hometown due to low facility in their own provinces and difference of quality and quantity of registration system in different provinces. As the evidence, the expected coverage of cancer incidence in different provinces can be mentioned; that the observed rate of incidence is high than expected in some provinces, on the other hand, it is much lower than expected in neighboring provinces. However it happens while we expect that the rate of cancer incidence be about the same in neighboring provinces that are quite similar in environmental conditions and lifestyle. In the absence of a gold standard, statistical methods help to overcome this problem. There are two approaches to reduce the effects of misclassification error; the first is using a small validation sample and the second is a Bayesian analysis which provides subjective prior information for the subset of the parameters for re-estimate and corrects the statistic.

Materials and methods: Data for this study were extracted from Iranian annual national cancer registration report in 2008. The Age Standardized Rate (ASR) due to gastric cancer (coded according to the 10th revision of the International Classification of Diseases [ICD-10; C16]) were expressed as rate per/100,000 population for male and female of North, South and Razavi Khorasan. To correct the misclassification effect, a Bayesian approach was used with Poisson count regression. To perform Bayesian inference, we assumed an informative beta prior distribution for the misclassified parameter. Because the misclassified parameter is unknown, a latent variable approach was employed to simplify the full conditional models and estimate the posterior distribution using a Gibbs sampling algorithm. Expected coverage of each province was used as priors for the parameters of beta distribution. Analyses were carried out using R software version 3.2.0.

Result: All incidence records due to gastric cancer for Khorasan provinces that have registered at Iranian annual national cancer registration report in 2008 were included in this study. The reported percent of expected coverage of cancer incidence for Razavi Khorasan